

PATENT CLAIMS

1. A process for pyrolyzing hydrocarbon-containing waste products, in particular used tires, in which

5 a) the material which is to be pyrolyzed is introduced into or onto a receiving device (40, 50) in a loading station outside the furnace (1),

b) the receiving device (40, 50) is then introduced from below into a pyrolysis furnace which is open at the  
10 bottom, at the same time tightly closing the furnace (1),

c) after which the furnace (1), by means of burners (7), is heated to the pyrolysis temperature of approximately 500°C and the pyrolysis is carried out,

d) then, after pyrolysis has concluded, the receiving  
15 device (40, 50) is removed downward and is moved into an unloading station, where the residues are discharged,

e) and another receiving device which is laden with material to be pyrolyzed is moved out of the loading station to the furnace and is inserted into the latter.

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2. The process as claimed in claim 1, characterized in that for the purpose of keeping the furnace (1) warm on an interim basis while it is being loaded and unloaded from

below, the furnace is kept warm with the aid of its own outgoing hot air or heat-exchanger air.

3. The process as claimed in claim 1, characterized in that  
5 during the pyrolysis of used tires (44), the tires are stacked in rows on top of one another on at least one vertical, upwardly facing receiving rod (42) (spacer rods) of the receiving device (40).
- 10 4. The process as claimed in claim 1, characterized in that during the pyrolysis of agricultural and forestry products or bulk material (54), the latter are introduced into receiving containers (51) which can be stacked vertically on top of one another and are easy to remove.
- 15 5. The process as claimed in claim 3, characterized in that the receiving device (40, 42), in the unloading station, is tilted through 30° to 90° with respect to the vertical and is shaken, for the purpose of removing the solid  
20 pyrolysis residues which are capable of flowing, after which the metal constituents which have remained attached to the receiving rods (42) are pulled off these rods.

6. The process as claimed in claim 4, characterized in that in the unloading station the receiving containers (50, 51) are removed from the receiving device (56) in the vertical direction and the solid pyrolysis residues situated therein are discharged by suitable tilting and shaking or suction, after which they are loaded again and are inserted into a receiving device (50) again.
7. A plant for carrying out the process as claimed in claims 1 to 6, comprising
- a pyrolysis furnace (1), which is an externally heated double-walled furnace with helical transverse walls (5) which lead from the bottom upward and form a helical channel (6) for the hot air,
  - the furnace having a vertically lowerable base (45) and being designed so that it can be loaded and unloaded vertically from below via this base.
8. The plant as claimed in claim 7, characterized in that at least one material-receiving device (40, 50) is provided, which can be attached to the top side of the vertically moveable base (45) or is part of the base, therefore at the same time is the closure bottom plate (45) of the furnace (1).

9. The plant as claimed in claim 8, characterized in that for a furnace a plurality of furnace bases (45, 47), each with a receiving device for the material to be pyrolyzed  
5 arranged fixedly thereon are provided.

10. The plant as claimed in claim 8, characterized in that only one furnace base (45, 47) and a plurality of separate receiving devices (40, 50) which interact with  
10 this base are provided, which receiving devices are designed so that they could be rapidly attached to the bottom plate (45) of the furnace base by means of screws.

11. The plant as claimed in claim 8, characterized in that  
15 for the pyrolysis of used tires (44), the receiving device (40) has receiving rods (42), which are attached to a bottom plate (41) and project vertically, for stacking rows of the tires (44) on top of one another.

20 12. The plant as claimed in claim 11, characterized in that for the pyrolysis of comminutable material which is capable of forming a bulk material, at least one stackable receiving container (41) with lateral wall openings is provided as a perforated-plate container.

13. The plant as claimed in claim 7, characterized in that for reliable introduction of the receiving devices (40, 50), at least three introduction rods (43) which are arranged vertically close to the outer circumference on the base plate (41) thereof are provided on the receiving rods, while vertical introduction rails (33), which are arranged at a radial distance from the furnace inner wall (4) and have opening-side introduction slopes (34), are arranged in the pyrolysis furnace (1).
14. The plant as claimed in claim 7, characterized in that the pyrolysis double-walled furnace (1) can be heated from the outside by electrical means or by means of oil or gas burners (6), and in that the cylindrical furnace inner wall (4) is equipped with heat-emitting plates or radiation ribs (31) which face radially inward and extend as far as the introduction rails (33).
15. The plant as claimed in claim 7, characterized in that the upper hot-air or off-gas pipe (11) and/or the line from a heat exchanger to an introduction connection piece or supply pipe (16) is guided at the bottom end of the furnace (1).

16. The plant as claimed in claim 7, characterized in that the helical transverse walls (5) of the helical duct (6) are only welded onto the furnace inner wall (4), while they are connected to the furnace outer wall (3) in a thermally insulated manner, and in that the furnace walls (3, 4) in the vicinity of the burner (7) are designed with fire clay, and the furnace overall has a thermally insulating jacket (30) on the outside.

17. The use of pyrolyzed carbon produced using the process and plant as claimed in the preceding claims, in combination with a small proportion of cement, for construction materials with high thermal insulation properties.

18. The use of pyrolyzed carbon in combination with gypsum or refractory cement for fireproofing elements, such as fireproof panels, fireguards or heat shields.

19. The use of pyrolyzed carbon as claimed in claim 18, characterized in that a mixing ratio of three parts carbon to one part gypsum is used.

20. The use of pyrolyzed carbon as a fire-extinguishing means, for example for extinguishing burning oil, large fires, forest and bush fires, and fires on water.

5 21. The use of pyrolyzed carbon for preventing oil pollution in particular after an oil tanker accident, carbon being scattered on the slick of oil and the carpet of carbon which has sucked itself full of oil, floats on top of the water and is of considerably reduced area is scooped out  
10 and the separation into oil and carbon is carried out again by subsequent pyrolysis.